livemix™
personal monitoring system

DIGITAL AUDIO
LABS

MIX-16
CENTRAL MIXER

USER GUIDE

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Chanhassen, MN 55317
952-401-7700
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www.digitalaudio.com

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SAFETY INSTRUCTIONS

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. CONTACT DIGITAL AUDIO LABS FOR SERVICING.

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of un-insulated and/or potentially dangerous voltage within the products enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

POWER CORD NOTICE FOR INTERNATIONAL OPERATION
Please call Digital Audio Labs Support at 952-401-7700.

Important Safety Instructions

1. Read and understand this entire manual.
2. Keep this manual available for reference.
3. Heed all warnings and precautions in this manual and notices marked on the product.
4. Do not use this product near water or damp environments.
5. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
6. Provide for proper airflow around product. Do not install near products that produce high levels of heat. Do not expose the unit to direct sun light or heating units as the internal components' temperature may rise and shorten the life of the components.
7. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong.
8. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they connect to the product. Do not use the unit if the electrical power cord is frayed or broken.
9. Only use attachments/accessories specified by the manufacturer.
10. Unplug this product during lightning storms or when unused for long periods of time.
11. Refer all servicing to qualified service personnel. There are no user serviceable components inside the product.
12. The product shall not be exposed to moisture. Do not touch the unit with wet hands. Do not handle the unit or power cord when your hands are wet or damp.
13. The product should be connected to a power supply only of the type described in the operating instructions or as marked on the product.

Care

- From time to time you should wipe off the front and side panels and the cabinet with a dry soft cloth. Do not use rough material, thinners, alcohol or other chemical solvents or cloths since this may damage the finish or remove the panel lettering.
- The Livemix system is capable of delivering high levels of volume. Please use caution with volume levels, listen with the lowest possible volume for proper operation and avoid exposure to prolonged high volume levels.
- The manufacture cannot be held responsible for damages caused to persons, personal possessions, or data due to an improper or missing ground connection.

CONTENTS

Safety Instructions ii
Important Safety Instructions ii
Care ii
Digital Audio Labs Limited Warranty 1
Repair Policy 1
Warranty Service 1
Non-Warranty Service 1
Contents of Box 2
Introduction 2
Anatomy of the MIX-16 2
Setup Diagrams 4
Analog Input to MIX-16 4
Digital Input to MIX-16 4
MIX-16 to CS-DUO Control Surfaces 5
Setup and Operation 6
Using the USB Output 6
Livemix System Overview 7
Troubleshooting 8
Livemix Support 9
Technical Specifications 9
Open Source Statement 10

DIGITAL AUDIO LABS LIMITED WARRANTY

Digital Audio Labs warrants their products against defects in material and workmanship for a period of two years from date of purchase. During this period, Digital Audio Labs will, at its option, repair the defective unit or replace it with a new or rebuilt one.

The warranty does NOT cover:

- Damage due to abuse, misuse, or accident.
- Damage due to operation contrary to the instructions in the product instruction manual.
- Units on which the product serial number has been removed or altered.
- Units that have been serviced by unauthorized personnel.

All implied warranties, including warranties on merchantability and fitness, are limited in time to the length of this warranty. Some states do not allow time limitations on implied warranties, so this limitation may not apply to you. Digital Audio Labs' liability is limited to the repair or replacement of its product. Digital Audio Labs shall in no way be held liable for incidental or consequential damages resulting from the use of their product or its software, including, without limitation, damages from loss of business profits, business interruption, loss of business information or other pecuniary loss. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Repair Policy

Please do not return the product without obtaining an RMA number first. Contact Digital Audio Labs at support@digitalaudio.com to acquire an RMA number. Do not return the product to the place of purchase. Please write the RMA number on the outside of the shipping carton. Any product sent to us without a valid RMA number will be refused. Include the following with the product: a brief description of the problem, your name, return shipping address, phone number and the RMA number. Do not include any accessories. DAL is not responsible for any damage to or loss of the product during transit. We recommend that customers obtain a receipt and tracking number for all packages shipped to us. Turnaround time on repairs is generally ten business days. If you live outside of the United States, please contact your local distributor for warranty service.

Please return product to:
Digital Audio Labs
Attn: RMA Number
1266 Park Road
Chanhassen, MN 55317
USA

Warranty Service

You will be required to pay the shipping charges when you ship your product to DAL. DAL will pay for return shipping via UPS ground. We reserve the right to inspect any product that may be the subject of any warranty claim before repair is carried out. For warranty service, we may require proof of the original date of purchase if you have not registered your product with DAL. Final determination of warranty coverage lies solely with Digital Audio Labs.

Non-Warranty Service

If it is determined that the product does not meet the terms of our warranty, you will be billed for labor, materials, return freight and insurance. There is a $50 USD minimum charge for materials and labor. Appropriate shipping charges will be applied. We require payment in advance of repair by credit card; we accept Visa and Master Card. In the event the charges are over the minimum charge, DAL will contact you and inform you of the cost of the repair before any work is completed.

CONTENTS OF BOX

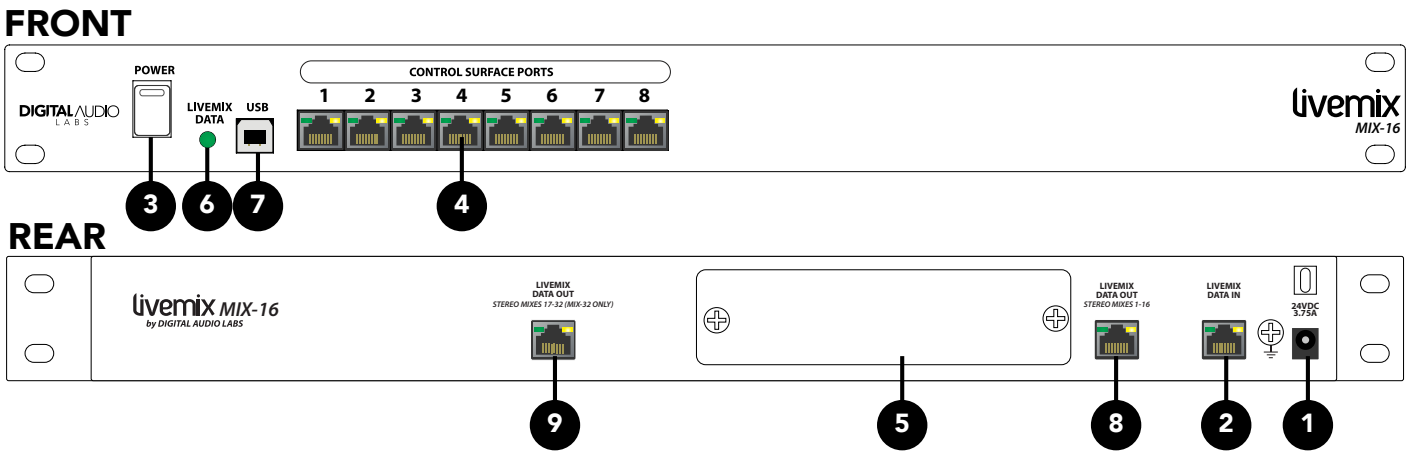
- MIX-16
- External Power Supply

INTRODUCTION

The MIX-16 is the Central Mixer of the Livemix system. Although the Control Surfaces are where most of the mixing is controlled, the actual mixing happens in the MIX-16. The MIX-16 contains the following features:

- 24-channel digital input
- 24-bit digital mixing and processing
- Provides power and audio to attached control surfaces over a single cable
- Provides 16 separate monitor mixes
- USB Connection to Windows PC or Apple OS X computer

Anatomy of the MIX-16



1. **External Power Supply Connector:** Connect the included power supply to this jack. Only use the power supply that is supplied with your MIX-16 (24V / 3.75A). Contact support for a replacement power supply.

2. **Livemix Data In:** This is the input for the MIX-16. Connect a shielded CAT5 cable from the Livemix Data Out port on the AD-24 to the Livemix Data In. This will be unused if using the Dante Option Card.

3. **Power Switch:** This switch turns power on/off to the MIX-16 unit. The MIX-16 supplies power to connected Control Surfaces. Turning the power on/off will also power on/off all connected Control Surfaces.

4. **Control Surface Ports**: Each port supplies both power and audio to connected Control Surfaces through a standard CAT5 cable.

   Two indicator lights on each port report device status information.
   - The green light will illuminate when a CS-DUO has a valid connection with the MIX-16.
   - The yellow light is a fault indicator. It may illuminate briefly when each control surface is powered on. If it remains lit, this indicates a problem with the port, the CAT5 cable or the CS-DUO.

NOTE:
If power is ever interrupted to the MIX-16, the CS-DUO will automatically return to the last loaded mix when it powers back on. Additionally, the MIX-16 will automatically return to the last loaded Global Template.

5. **Option Card Bay:** This bay is used to provide access to additional input formats. When using an option card, such as the LM-DANTE-EXP Dante card, the system must be configured for digital input. This can be done on the CS-DUO (see CS-DUO guide for more information).

6. **Livemix Data Light:** This light will change color to indicate the audio and power status of the MIX-16. With both analog and digital inputs, if the light is off, there is no power to the MIX-16. Any illuminated light color means that power is on to the MIX-16.

If using the AD-24 with analog inputs:
- The light will illuminate green when the MIX-16 is receiving audio data
- The light will illuminate red when there is no audio data present

If using the Dante Option Card:
- A green light means there is no "problem" with the audio; this could also mean no connections have been made (See LM-DANTE-EXP manual for more information)
- A yellow light means at least one Dante channel is not connected properly (See LM-DANTE-EXP manual for more information)
- A red light means that at least one channel is reporting an error (See LM-DANTE-EXP manual for more information)

7. **USB Port:** The USB port connects to a Windows PC or Apple OS X computer, and allows the computer to record a 2-channel stereo mix of one of the mixes generated by a CS-DUO. Common uses for this type of recording include:

   - Recording a worship service for a later podcast
   - Documenting a band performance for later evaluation

NOTE:
When using the MIX-16 USB port with a computer, please keep in mind that the audio provided has the following characteristics:

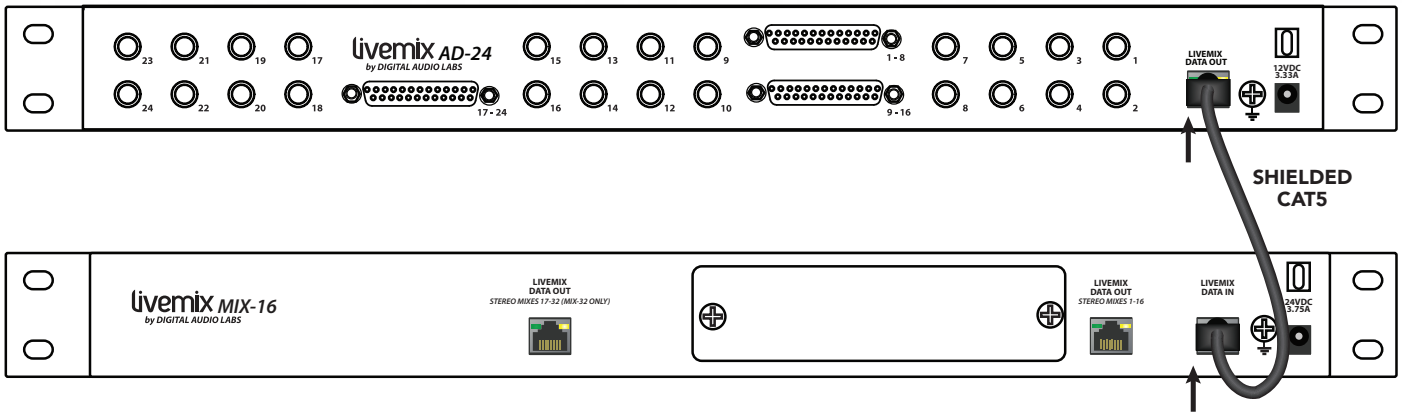
- 48 Khz sample rate
- 16-bit bit rate
- Stereo signal

8. **Livemix Data Out (Mixes 1-16):** This port is intended to connect to future Livemix products, it is currently inactive.

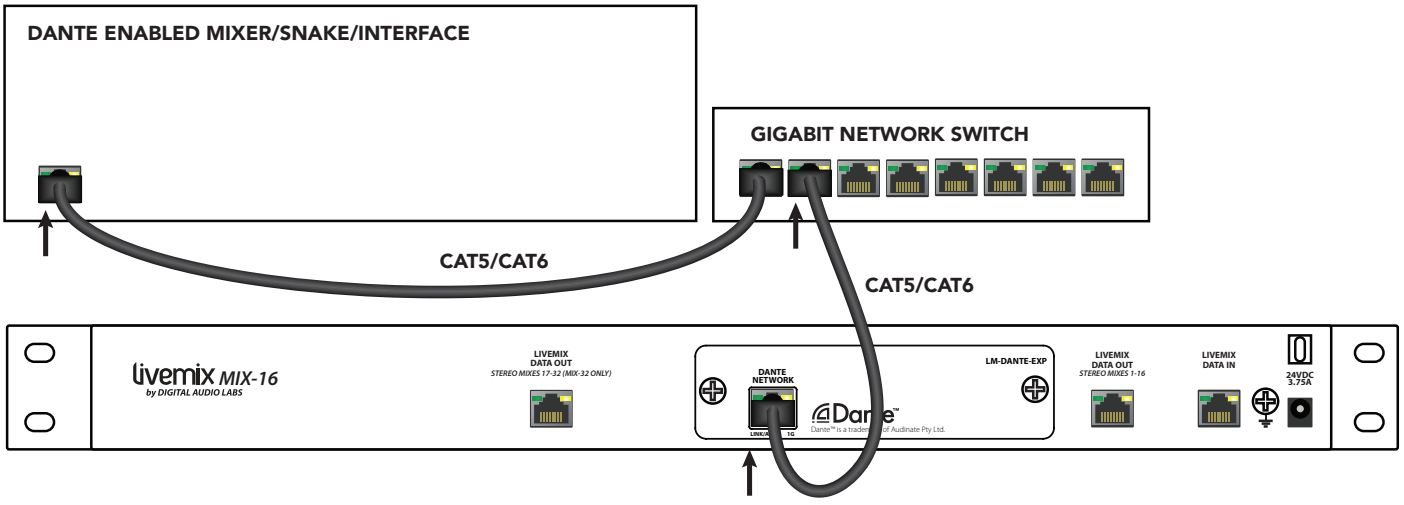
9. **Livemix Data Out (Mixes 17-32):** This port is intended to connect to future Livemix products, it is currently inactive.

SETUP DIAGRAMS

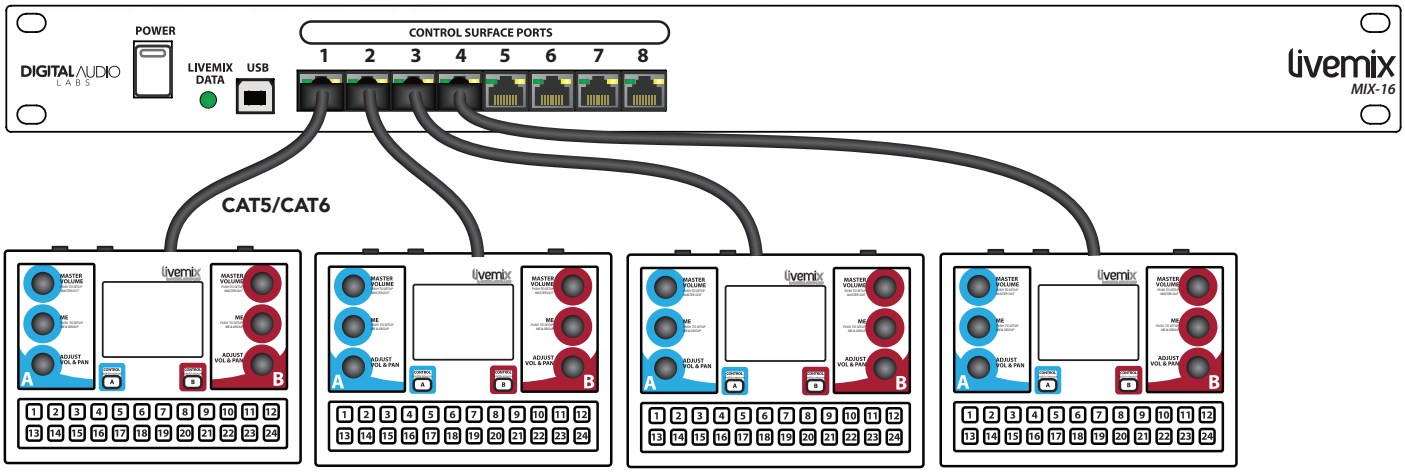
Analog Input to MIX-16



Digital Input to MIX-16



MIX-16 to CS-DUO Control Surfaces



SETUP AND OPERATION

Although the MIX-16 is the Central Mixer of the Livemix system, there are no direct controls. Setting up the MIX-16 is simple and all configuration is done through an attached Control Surface (covered in the CS-DUO manual).

1. If using the analog input, connect the Livemix Data Out port on the AD-24 to the Livemix Data In port on the MIX-16. Please use shielded CAT5 or CAT6 cable to make this connection. If using an option card, you will not use the Livemix Data In port.
2. Connect each Control Surface to a Control Port on the front of the MIX-16. These do not have to be sequential.
3. Connect the Power Supply on the back of the MIX-16 to an appropriate power source.
4. Turn on the MIX-16.

NOTE:
The audio data sent over the Livemix system is a proprietary data format. It will not work with a switch or a standard Ethernet network. When using an Option Card designed for networked audio use, such as the LM-DANTE-EXP, consult the Option Card manual for information on how to connect to the network.

NOTE:
Networking cable comes in a variety of "flavors". For the purposes of Livemix, either CAT5e or CAT6 cabling is appropriate.

USING THE USB OUTPUT

The MIX-16 is equipped with a USB port for connection to a computer. When connected, the MIX-16 will show up on the computer as a USB audio class device. When used with recording software, the stereo output of any single CS-DUO can be recorded.

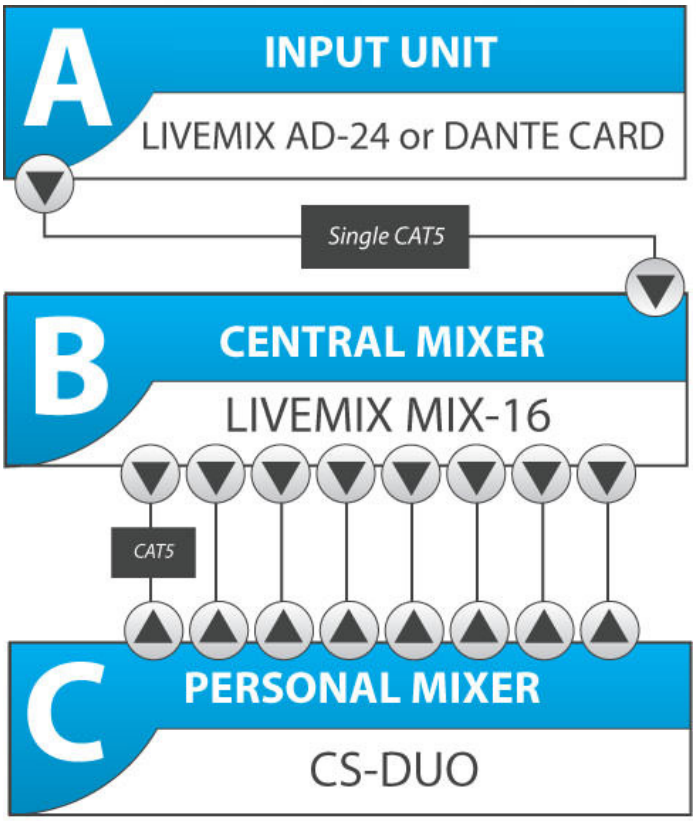
All configuration for this feature is performed on an attached Control Surface.

- Select a CS-DUO mix to assign to the USB Port and select the *Mix Tools* menu on that mix
- Press *Global Setup*
- Press the *MIX-16-/32 USB Mix Assign* button
- You will see a message that says "Send your mix to the MIX-16 USB record port?" Press "Yes" to assign or "No" to cancel

The stereo mix from that CS-DUO will now be sent to the USB port of the MIX-16. Connect to a Windows PC or Apple OS X computer and record the stereo signal into the audio recording software of choice.

LIVEMIX SYSTEM OVERVIEW

There are three components required to make a Livemix system. Each system will have either an analog or digital input unit, a central mixer unit, and at least one attached control surface.



Input Options

Users with analog source material will use the AD-24. Using the TRS or DB-25 inputs, audio from the source material is made available to the Livemix system.

Users with digital source material will use the Dante Option Card (LM-DANTE-EXP). This is an option card that is installed in the MIX-16 and allows the Livemix system to receive audio from a Dante based network.

Central Mixer Options

The Livemix Central Mixer processes and distributes digital audio and power to connected Control Surfaces. Control up to 16 personal mixes with the Livemix MIX-16.

Control Surface

Livemix needs at least one connected controller to make a mix. Livemix Bundles (both Analog and Digital) come with 4 Livemix CS-DUO units for a total of 8 personal mixes. Each Livemix CS-DUO connects via network cable to one of the ports of the MIX-16. Using various controls on the unit, two users can each create their own custom mix, which is then output to headphones, in-ear monitors or stage monitors, right from the CS-DUO unit.

TROUBLESHOOTING

My MIX-16 is not powering on correctly.

- Verify that you have connected the external power supply to a working power outlet
- Verify that the front panel power switch is set to ON.

I am not seeing the "Livemix Data" light illuminate.

If the Livemix Data light is not illuminating, there is a problem with the power to the MIX-16. Check to make sure that the power supply is connected to the MIX-16 and that all the cables are secure. Also check to ensure that the power supply is plugged into an appropriate power source and that the power cable from the source to the power supply transformer is securely attached.

I have connected the USB port to my computer but am not receiving any audio into my recording software.

- Verify that you have properly assigned a specific CS-DUO monitor mix to the USB port (see CS-DUO user's manual for more details)
- Verify that you have configured your Windows PC or Apple OS X computer properly to use the MIX-16 as the desired audio input to your software

I was planning on feeding the MIX-16 from my digital mixer, but do not see the right connector to use on the MIX-16.

- The MIX-16 interfaces with digital consoles through the use of an option card that inserts into a slot and offers the necessary connectors.
- Verify that you have the correct digital option card installed.

LIVEMIX SUPPORT

Phone Support: 952-401-7700
Toll Free: 844-DAL-INFO
Email Support: support@digitalaudio.com
Website: www.digitalaudio.com/support

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TECHNICAL SPECIFICATIONS

MIX-16 SPECIFICATIONS

Max Cable Length from CS-DUO	100 ft CAT5 Cable
Max Cable Length from AD-24	300ft Shielded CAT5 Cable
Bit Rate	24-Bit Digital Mixing and Processing
Sample Rate	48 Khz
USB Output	16-bit / 48 Khz Stereo
Digital Format	Proprietary in System
Expansion	Option Card Bay

LIVEMIX SYSTEM SPECIFICATIONS

THD+N (18 dBu 1KHz input)	.03% (100mW, 22Ω Load)
	.014% (100mW, into 32Ω Load)
	.005% (100mW into 64Ω ohms)
	.003% (100mW into 300Ω)
S/N Ratio	103dB
Frequency Response	20Hz-22KHz ± 3dB
Crosstalk (Left to Right)	-103 dB
Latency	1.5 mS

Open Source Statement

The Livemix MIX-16 firmware includes the open source software module FreeRTOS, which is licensed under the terms of the GNU General Public License (version 2) AND MODIFIED BY the FreeRTOS exception, as outlined in the FreeRTOS license. In accordance with those licensing terms, we must provide you the source code for the version of FreeRTOS used in the MIX-16. You may download the FreeRTOS source code at http://www.digitalaudio.com/open-source-center.